Ordering number: EN 2291B

Monolithic Linear IC



No. 2291B

LA1266

AM/FM Tuner System of Electronic Tuning Type

Function

FM: IF amp, quadrature detector, AF preamp, signal meter, IF count output, tuning indicator drive output (common with stop signal, muting drive output)

AM: RF amp, MIX, OSC (with ALC), IF amp, detector, AGC, signal meter, tuning indicator drive output (common with stop signal), IF count output, local OSC buffer

Features

- Minimum number of external parts required
- Excellent S/N
- Local OSC with ALC
- Local OSC buffer
- Tuning indicator pin (common with narrow-band stop signal and muting drive output)
- Variable stop sensitivity (variable separately for FM, AM)
- Less tweet interference
- Signal meter pin
- IF count output

Maximum Ratings at Ta=25°C

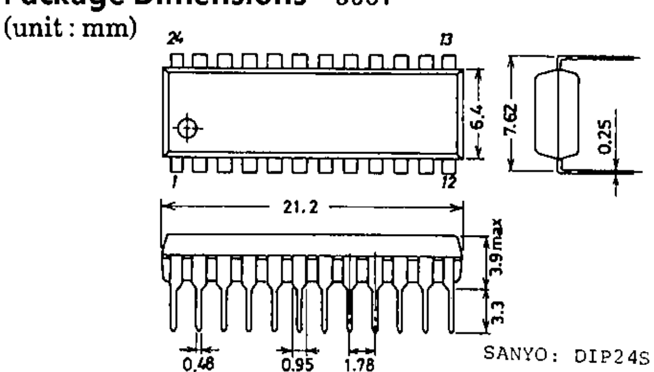
				unit
Maximum Supply Voltage	V_{CC}max	Pins 7,8,20	16	V
Flow-in Current	I8	Pin 8	20	mA
Flow-out Current	I22	Pin 22	1	mA
	I24	Pin 24	2	mA
Allowable Power Dissipation	Pdmax	Ta≦60°C	700	mW
Operating Temperature	Topr		-20 to +70	°C
Storage Temperature	Tstg		-40 to +125	°C

Operating Conditions at Ta=25°C

			unit
Recommended Supply Voltage	V_{CC}	8.5	V
Operating Voltage Range	V_{CC}op	6 to 14	V

Package Dimensions 3067

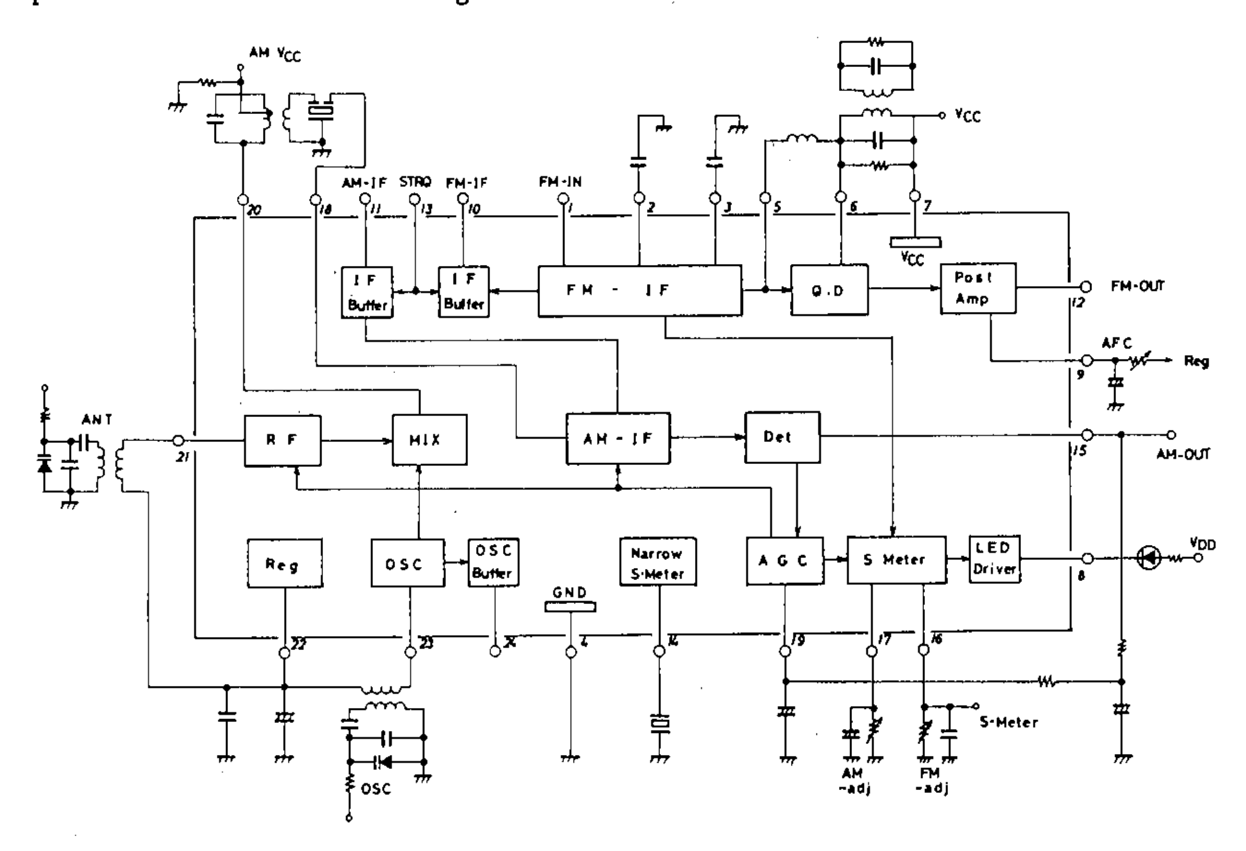
(unit : mm)



Operating Characteristics at Ta=25°C, V_{CC}=8.5V, See Test Circuit.

			min	typ	max	unit
(AM:fc=1MHz,fm=1kHz)						
Quiescent Current	Icco	No input		22	30	mA
Detection Output	Vo(1)	Vi=20dBu,30% mod.	30	60	110	mV
	Vo(2)	Vi=80dBu,30% mod.	90	150	210	mV
Signal to Noise Ratio	S/N(1)	Vi=20dBu	15	19		dB
	S/N(2)	Vi=80dBu	49	54		dB
Total Harmonic Distortion	THD(1)	Vi=80dBu,30% mod.		0.3	1.0	%
	THD(2)	Vi=107dBu,30% mod.		0.3	1.0	%
Signal Meter Output	$V_{SM(1)}$	No input	0	0	0.2	V
	$V_{SM(2)}$	Vi=80dBu	1.8	2.8	3.5	V
LED Drive Sensitivity	LED-ON	I_{LED}=1mA	13	23	33	dBu
Local OSC Buffer Output	Vosc	fosc=1.45MHz	220	280	340	mV
IF Buffer Output	V_{IF}	Vi=20dBu	120	180	250	mV
(FM:fc=10.7MHz,fm=1kHz)						
Quiescent Curren	Icco	No input		29	40	mA
Input Limiting Sensitivity	-3dBL.S	3dB down,100% mod.		31	37	dBu
Demodulation Output	Vo	Vi=100dBu,100% mod.	270	390	540	mV
Signal to Noise Ratio	S/N	Vi=100dBu	78	84		dB
Total Harmonic Distortion	THD	Vi=100dBu,100% mod.		0.03	0.3	%
Signal Meter Output	$V_{SM(1)}$	No input	0	0	0.2	V
	$V_{SM(2)}$	Vi=100dBu	1.7	2.3	3.1	V
LED Drive Sensitivity	LED-ON	I_{LED}=1mA	46	61	76	dBu
LED Drive Bandwidth	LED-BW	Vi=100dBu, I_{LED}=1mA	70	105	140	kHz
AM Rejection	AMR	Vi=100dBu,100% mod. AM=1kHz,30% mod.	45	58		dB
IF Buffer Output	V_{IF}	Vi=50dBu	110	160	230	mV

Equivalent Circuit Block Diagram



How to use LA1266

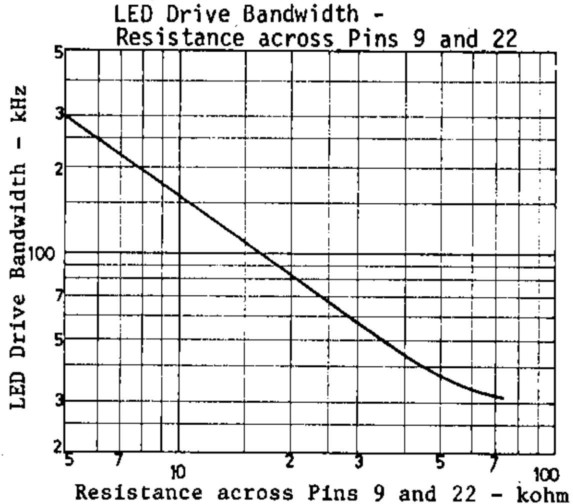
1. LED driver, muting drive output, stop signal(S.D)

① For LED drive, muting drive output, stop signal, the output at pin 8 is used.

② Voltage on pin 8, when tuned, turns from "H" to "L". (Active-low)

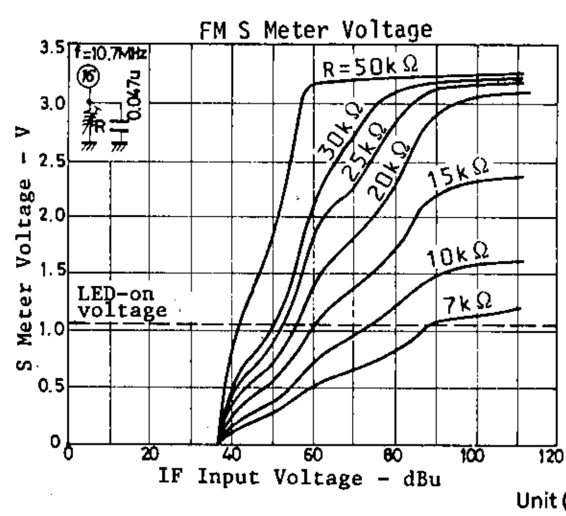
③ Signal bandwidth at pin 8

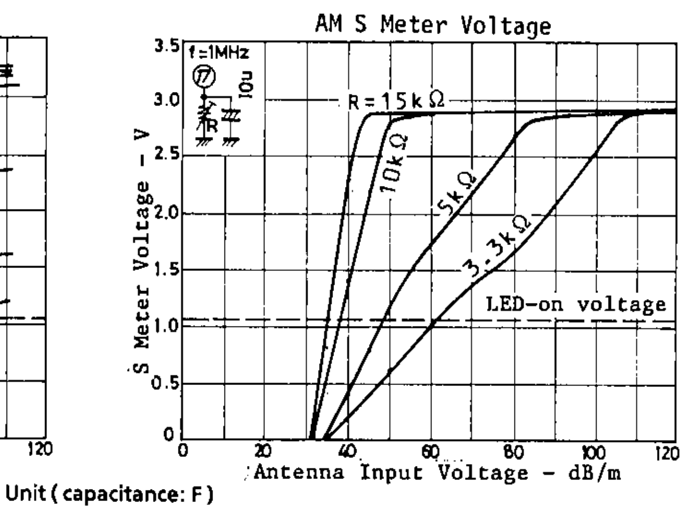
- For AM, the bandwidth depends on the C.F(BFU450CN) at pin 14. If a capacitor is connected in place of the C.F, the bandwidth will get wider.
- For FM, the bandwidth depends on the resistance across pins 9 and 22. If the resistance is increased, the bandwidth will get narrower. R=15kohms makes the bandwidth approximately 110kHz.



④ Sensitivity adjustment of LED, muting, stop signal

- For FM, the semifixed variable resistor across pin 16 and GND is used.
- For AM, the semifixed variable resistor across pin 17 and GND is used. The relation (for AM,FM) between signal meter voltage and input voltage with the resistance of the semifixed variable resistor as a parameter is shown below.

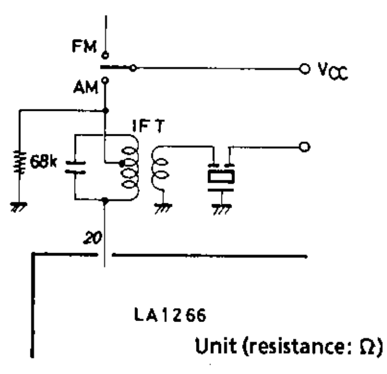




Unit (capacitance: F)

2. AM/FM changeover

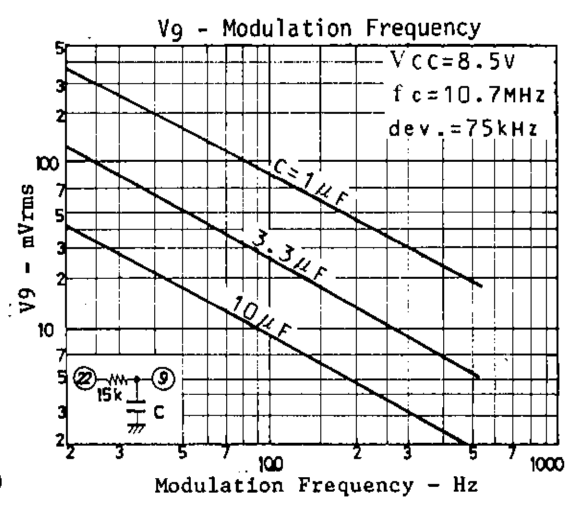
- AM/FM changeover is made using pin 20 as shown right.
- However, the voltage on pin 20 relative to V_{CC} (pin 7) must be within the range of +0.1V to -0.8V. If not within this range, distortion and selectivity will get worse. A resistance of 68kohms at the IFT cold terminal, which is used to prevent the changeover circuit from malfunctioning, must be connected.



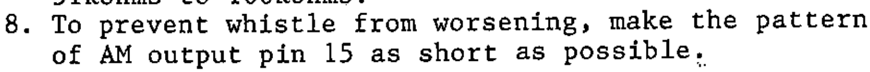
Unit (resistance: Ω)

3. Local OSC buffer output
   - When local OSC buffer output waveform is saw-toothed at the SW mode, connect a reistance of 1.2kohms or thereabouts across pin 24 and GND.

4. Capacitance across pin 9 and GND
   A large capacitance across pin 9 and GND may cause a misstop at an adjacent channel when the channel select speed is made faster at the automatic channel select mode. In this case, decrease the capacitance across pin 9 and GND. However, if too decreased, the LED will flutter at low modulation frequencies at the time of detuning. Therefore, it is recommended to fix the capacitance across pin 9 and GND to be 3.3uF to 10uF. The relation between modulation frequency and demodulation output voltage on pin 9 with the capacitance across pin 9 and GND as a parameter is shown right.

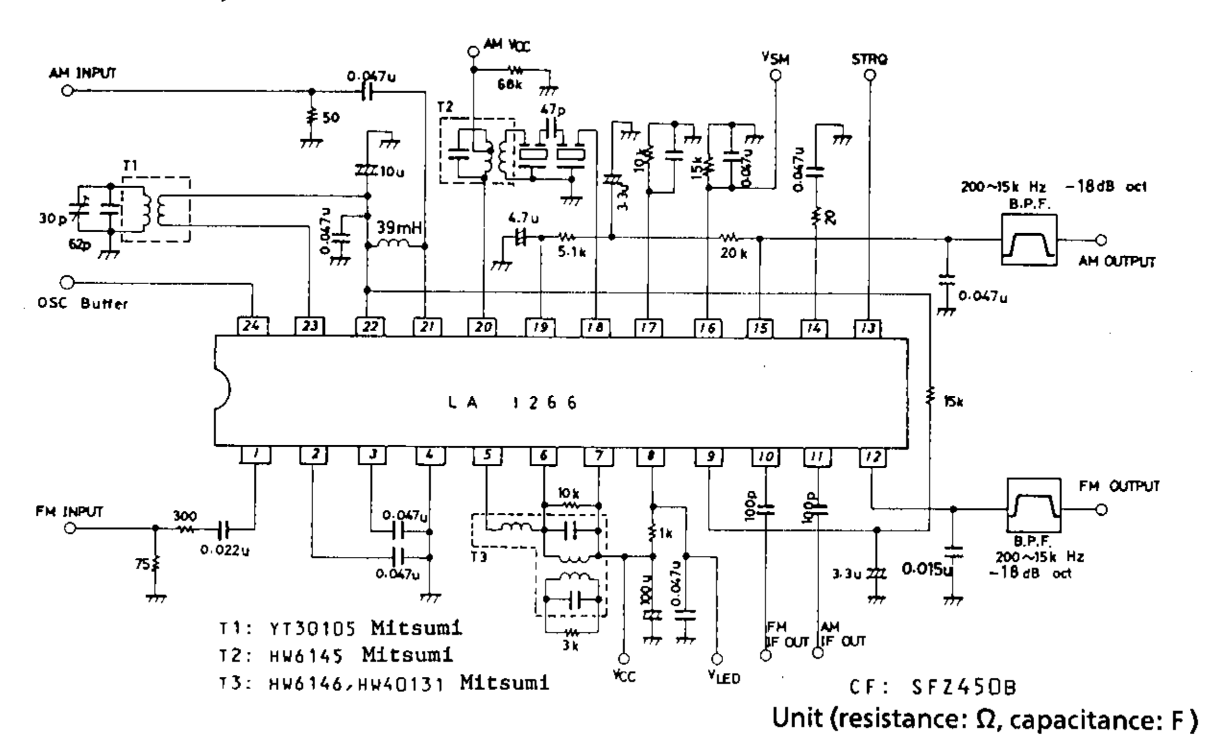


5. If the coupling coefficient of the local OSC coil is small and an antiresonance point of approximately 100MHz is present or the stray capacitance across pin 24 and pin 23 is large, a parasitic oscillation of approximately 100MHz may occur in the buffer output (pin 24). In this case, connect a capacitance of approximately 30pF across pin 24 and GND.
6. AM OSC coil
   Generally speaking, the following should be noted. Avoid winding with loose coupling between primary side and secondary side (especially SW1,SW2). To be concrete, the pot core type is better than the screw type which is loose in coupling. This prevents the local OSC frequency from turning third resonance frequency related to the coupling coefficient.
7. Resistance across pin 8 and V_{DD}
   If pin 8 is used for stop signal (SD) only, without using LED, it is recommended to fix resistance R_L across pin 8 and V_{DD} to be 51kohms to 100kohms.



8. To prevent whistle from worsening, make the pattern of AM output pin 15 as short as possible.
9. AM, FM IF buffer output
   Application of a voltage to pin 13 (STRQ) causes AM IF(455kHz) signal (at AM mode) and FM IF(10.7MHz) signal (at FM mode) to be delivered at pin 11 and pin 10, respectively. It is recommended that the voltage to be applied to pin 13 (STRQ) is 3.0V or greater.

Test Circuit: FM,AM-MW



Unit (resistance: Ω, capacitance: F)

AM Current Dissipation Characteristic

f=1MHz

Icc (Including no LED current)

Current Dissipation, I_{CC} – mA

Antenna Input Voltage – dB/m

FM Current Dissipation Characteristic

f=10.7MHz

Icc (Including no LED current)

Current Dissipation, I_{CC} – mA

Input Voltage, Vi – dBu

AM Input/Output Characteristic

f=1MHz

Detection output 1kHz-30%

Noise voltage

Noise Voltage, Detection Output – dBm

Antenna Input Voltage – dB/m

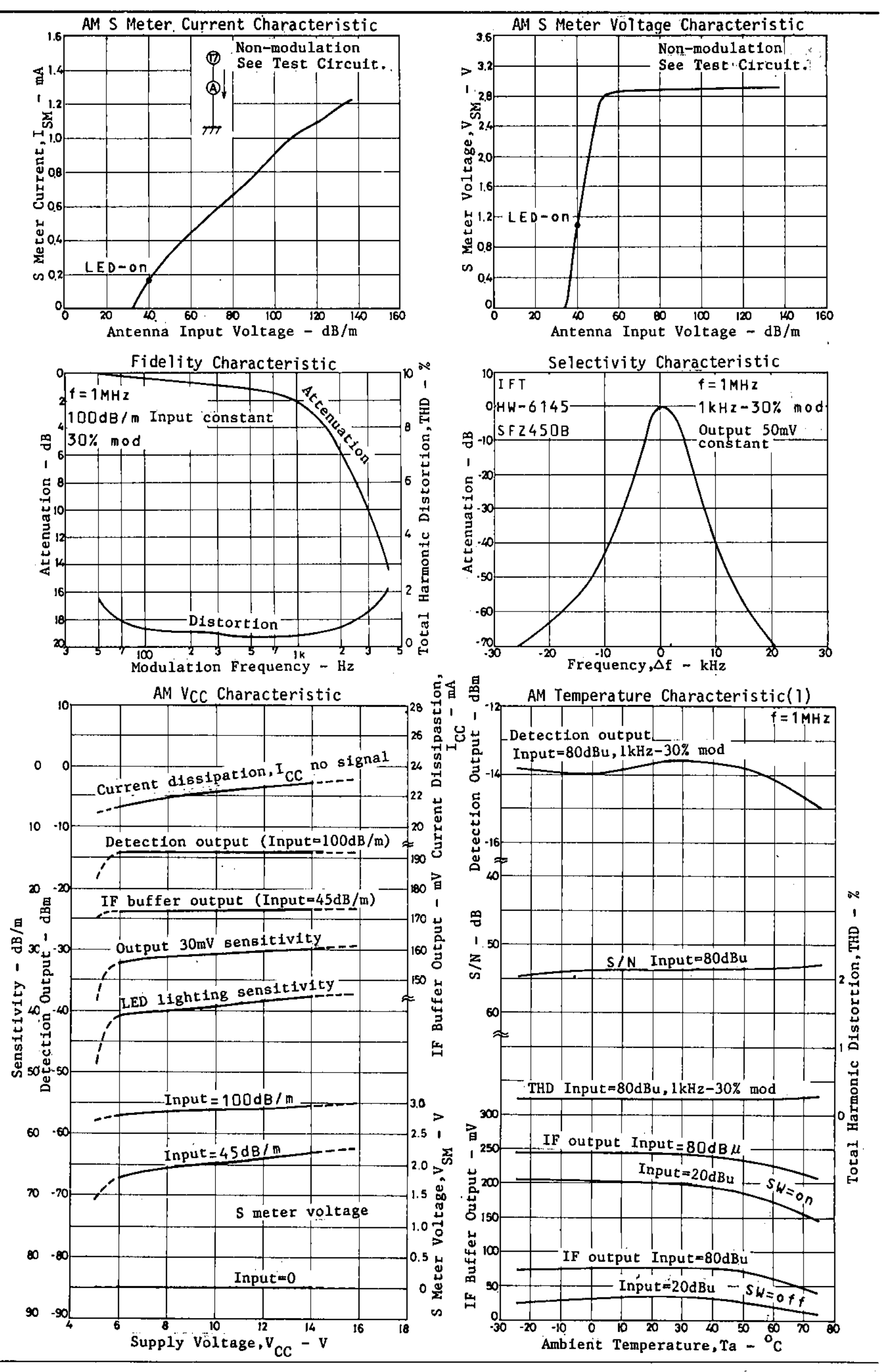
THD – V_i(ANT)

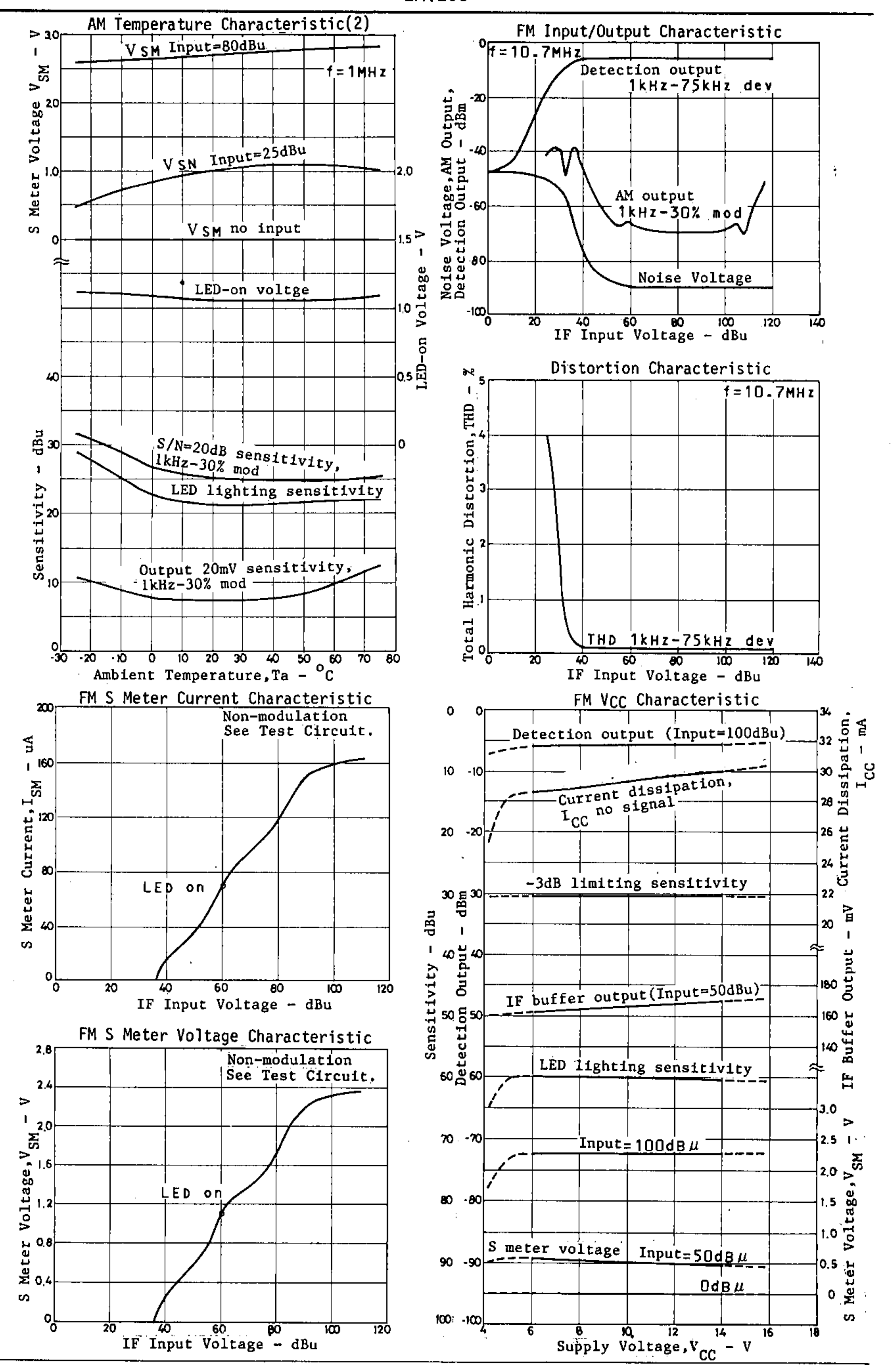
THD 1kHz-80%

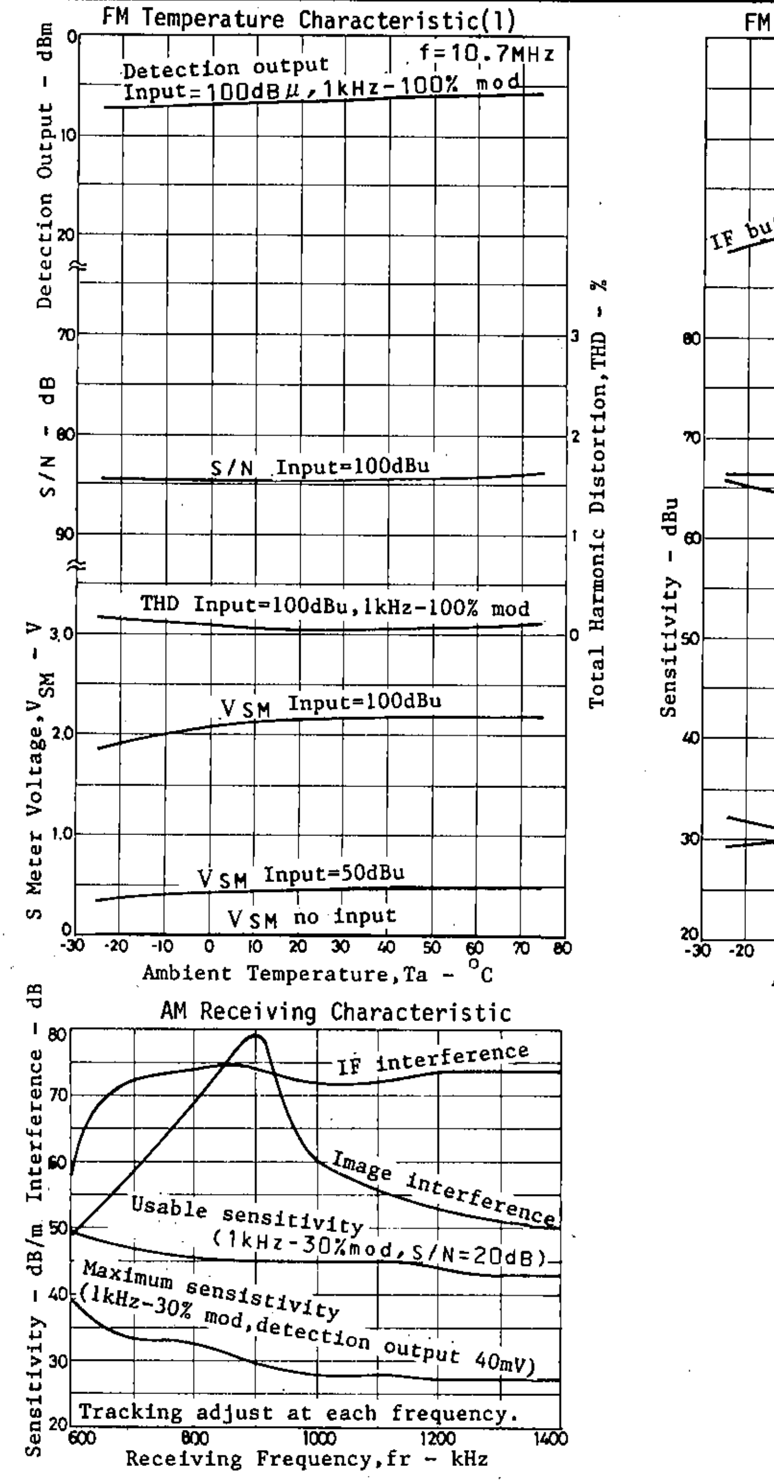
THD 1kHz-30%

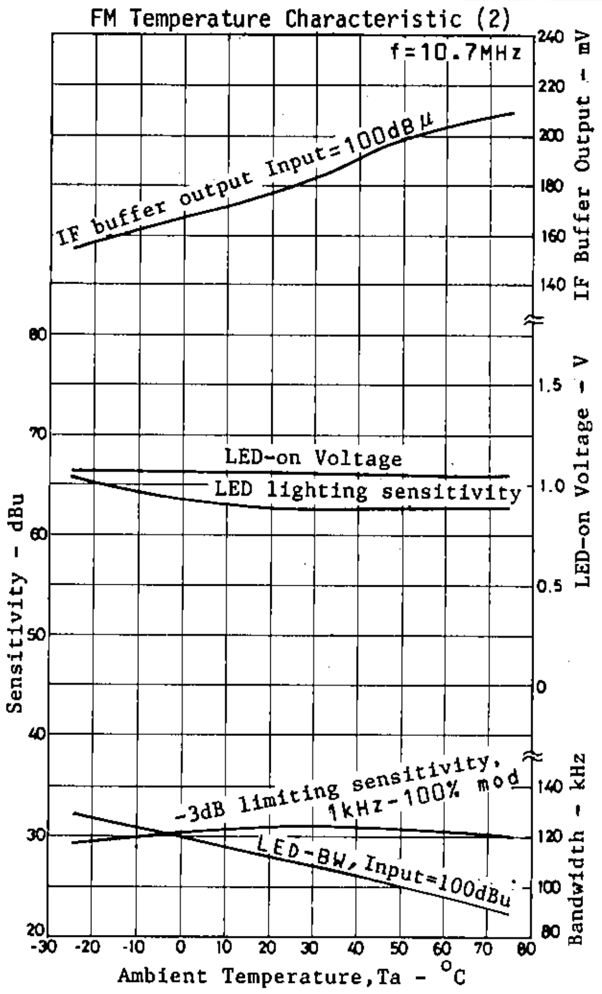
Total Harmonic Distortion, THD – %

Antenna Input Voltage – dB/m


AM S Meter Current Characteristic
Non-modulation
See Test Circuit.
LED-on
S Meter Current, I_{SM} - mA
Antenna Input Voltage - dB/m
AM S Meter Voltage Characteristic
Non-modulation
See Test Circuit.
LED-on
S Meter Voltage, V_{SM} - V
Antenna Input Voltage - dB/m
Fidelity Characteristic
f=1MHz
100dB/m Input constant
30% mod
Attenuation
Distortion
Attenuation - dB
Total Harmonic Distortion, THD - %
Modulation Frequency - Hz
Selectivity Characteristic
IFT
HW-6145
SFZ450B
f=1MHz
1kHz-30% mod
Output 50mV constant
Attenuation - dB
Frequency, Δf - kHz
AM V_{CC} Characteristic
Current dissipation, I_{CC} no signal
Detection output (Input=100dB/m)
IF buffer output (Input=45dB/m)
Output 30mV sensitivity
LED lighting sensitivity
Input=100dB/m
Input=45dB/m
S meter voltage
Input=0
Sensitivity - dB/m
Detection Output - dBm
Current Dissipation, I_{CC} - mA
IF Buffer Output - mV
S Meter Voltage, V_{SM} - V
Supply Voltage, V_{CC} - V
AM Temperature Characteristic(1)
f=1MHz
Detection output
Input=80dBu, 1kHz-30% mod
S/N Input=80dBu
THD Input=80dBu, 1kHz-30% mod
IF output Input=80dBμ
Input=20dBu
SW=on
IF output Input=80dBu
Input=20dBu
SW=off
Detection Output - dBm
S/N - dB
IF Buffer Output - mV
Total Harmonic Distortion, THD - %
Ambient Temperature, Ta - °C

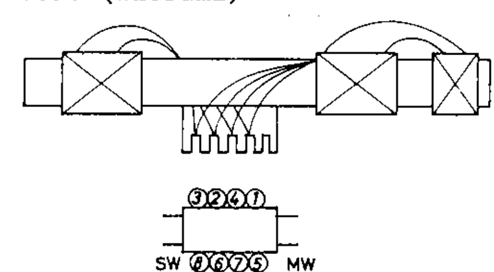

AM Temperature Characteristic(2)
S Meter Voltage V_{SM} - V
V_{SM} Input=80dBu
f=1MHz
V_{SN} Input=25dBu
V_{SM} no input
LED-on voltge
LED-on Voltage - V
Sensitivity - dBu
S/N=20dB sensitivity, 1kHz-30% mod
LED lighting sensitivity
Output 20mV sensitivity, 1kHz-30% mod
Ambient Temperature,Ta - °C
FM Input/Output Characteristic
f=10.7MHz
Detection output 1kHz-75kHz dev
AM output 1kHz-30% mod
Noise Voltage
Noise Voltage,AM Output, Detection Output - dBm
IF Input Voltage - dBu
Distortion Characteristic
f=10.7MHz
Total Harmonic Distortion,THD - %
THD 1kHz-75kHz dev
IF Input Voltage - dBu
FM S Meter Current Characteristic
Non-modulation
See Test Circuit.
S Meter Current,I_{SM} - uA
LED on
IF Input Voltage - dBu
FM S Meter Voltage Characteristic
Non-modulation
See Test Circuit.
S Meter Voltage,V_{SM} - V
LED on
IF Input Voltage - dBu
FM V_{CC} Characteristic
Detection output (Input=100dBu)
Current dissipation, I_{CC} no signal
-3dB limiting sensitivity
IF buffer output(Input=50dBu)
LED lighting sensitivity
Input=100dBμ
S meter voltage
Input=50dBμ
0dBμ
Sensitivity - dBu
Detection Output - dBm
Current Dissipation, I_{CC} - mA
IF Buffer Output - mV
S Meter Voltage,V_{SM} - V
Supply Voltage,V_{CC} - V


FM Temperature Characteristic(1)
f=10.7MHz
Detection output
Input=100dBμ,1kHz-100% mod
S/N Input=100dBu
THD Input=100dBu,1kHz-100% mod
VSM Input=100dBu
VSM Input=50dBu
VSM no input
Detection Output - dBm
S/N - dB
S Meter Voltage,VSM - V
Total Harmonic Distortion,THD - %
Ambient Temperature,Ta - °C
AM Receiving Characteristic
IF interference
Image interference
Usable sensitivity
(1kHz-30%mod,S/N=20dB)
Maximum sensitivity
(1kHz-30% mod,detection output 40mV)
Tracking adjust at each frequency.
Sensitivity - dB/m Interference - dB
Receiving Frequency,fr - kHz


FM Temperature Characteristic (2)
f=10.7MHz
IF buffer output Input=100dBμ
LED-on Voltage
LED lighting sensitivity
-3dB limiting sensitivity,
1kHz-100% mod
LED-BW, Input=100dBu
Sensitivity - dBu
IF Buffer Output - mV
LED-on Voltage - V
Bandwidth - kHz
Ambient Temperature,Ta - °C

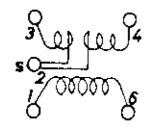
Coil Specifications

MW antenna
Bar antenna (for PVC22KTL)
.TN-10896 (Mitsumi)



① - ② 22T+49T, ③ - ④ 10T
Tight solenoid direct winding
⑤ - ⑥ 17T 0.5ϕ space winding
⑦ - ⑧ 4T tight solenoid winding
① - ② L=260uH, Qo=330(≧200)
⑤ - ⑥ L=15uH, Qo=250(≧150)

Loop antenna (for SVC321)
.LA300 (Korin Giken)
Loop antenna.matching ciol
.KL-412



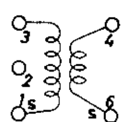
① - ⑥ 15.5T, ③ - ② 7T,
② - ④ 58T
Qo=200±20%
L=248uH±10%

YT-30150 (Mitsumi)



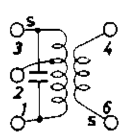
③ - ② 32T, ② - ① 32T
0.07mm 2VEW
Qo=140, L=140uH

KO-387 (Korin Giken)
For SVC321



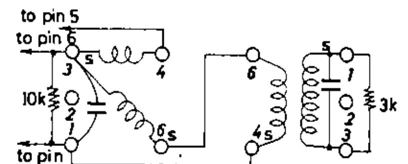
① - ③ 48T, ④ - ⑥ 20T
Qo=150±20%

AM IFT coil
Matching coil for SFZ450B
(2-element type)



.HW-6145 (Mitsumi)
③ - ② 67T, ⑥ - ④ 10T
② - ① 85T
Qo=70±20%, f=450kHz
Internal 180pF

FM double tuning detection coil
HW-6146 HW-40131

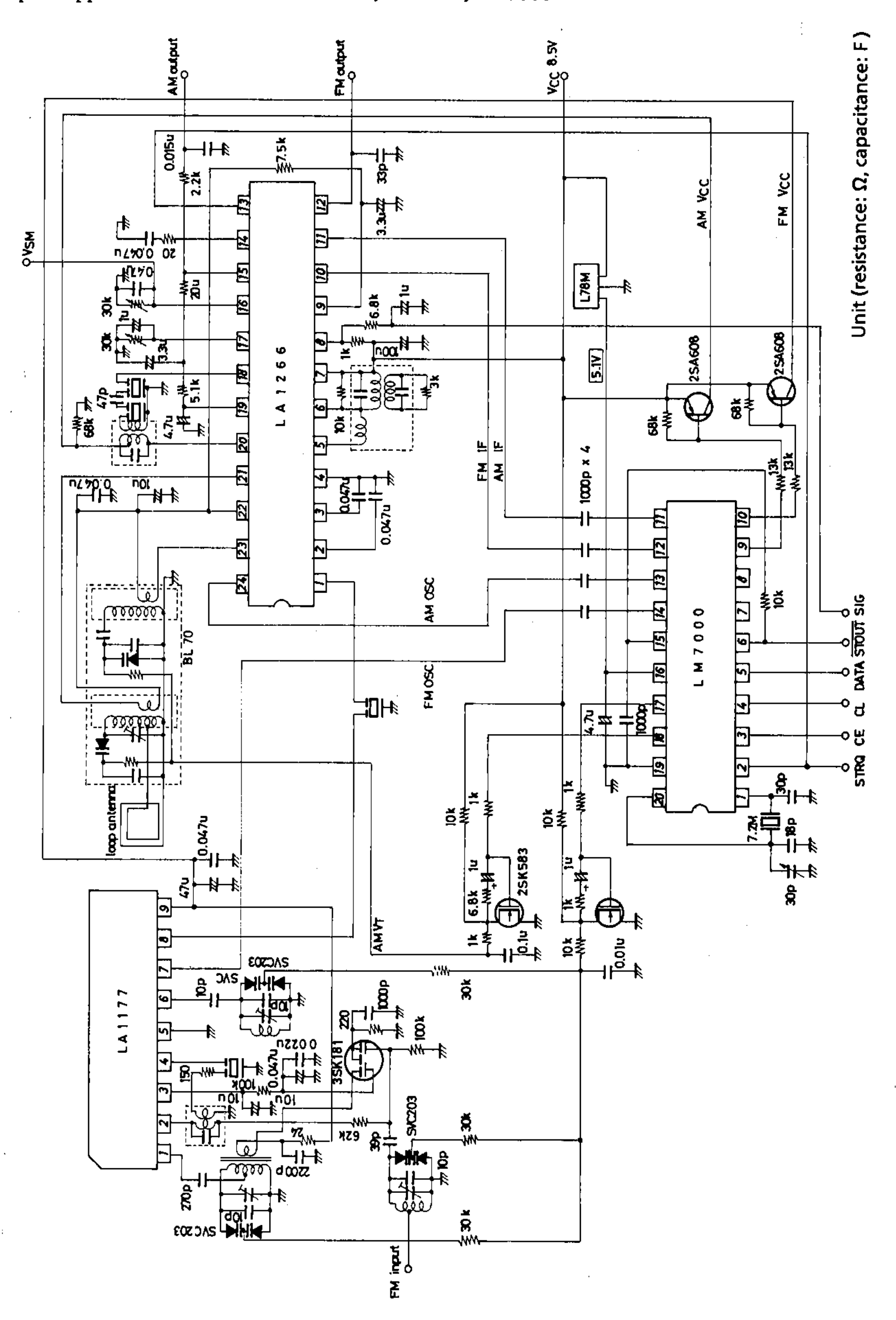


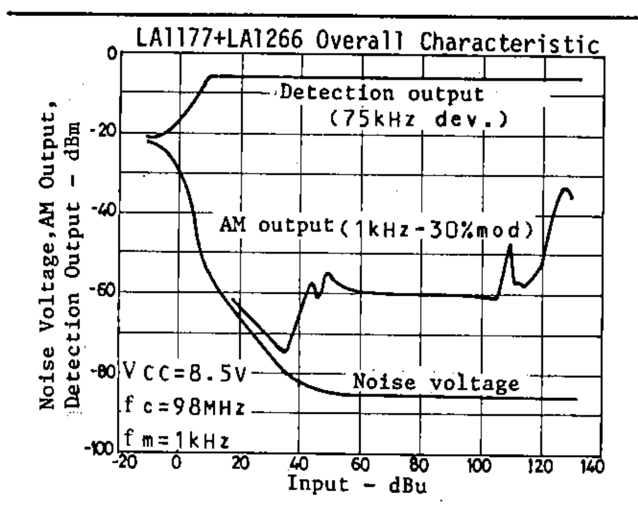
Unit (resistance: Ω)

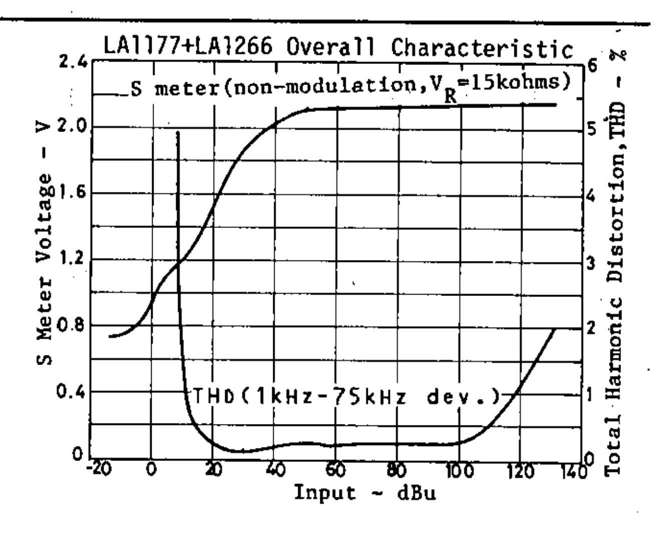
.HW-6146 (Mitsumi)
③ - ④ 86.5T
③ - ⑥ 13.5T
Qo=50±20%
Internal 100pF±10%

.HW-40131 (Mitsumi)
④ - ⑥ 1T
① - ③ 19T
Qo=35±20%
Internal 100pF±10%

Sample Application Circuit: LA1177, LA1266, LM7000




LA1177+LA1266 Overall Characteristic
Detection output
(75kHz dev.)
AM output(1kHz-30%mod)
Noise voltage
VCC=8.5V
fc=98MHz
fm=1kHz
Noise Voltage,AM Output, Detection Output - dBm
Input - dBu
0
-20
-40
-60
-80
-100
-20
0
20
40
60
80
100
120
140


LA1177+LA1266 Overall Characteristic
S meter(non-modulation,V_R=15kohms)
THD(1kHz-75kHz dev.)
S Meter Voltage - V
Total Harmonic Distortion,THD - %
Input - dBu
2.4
2.0
1.6
1.2
0.8
0.4
0
6
5
4
3
2
1
0
-20
0
20
40
60
80
100
120
140